Cave Handrail Project

Timpanogos Cave National Monument 2003

Summary

New handrails are needed along the tourist trail through the cave to improve visitor safety and resource protection. The present handrails are awkwardly placed and are highly maintained. Custom-bended, stainless-steel handrails are going to replace these outdated handrails. Comments on the handrail needs were collected and assessed. The planning and design stage is being completed. The construction will start next spring when the cave opens. The project will be completed by the end of the summer 2003.

General Specifications

The handrails will be installed following a few general considerations. All handrails will be constructed of 1.66 inch outer diameter, schedule 40 thickness, 304 stainless-steel pipe. All new handrails should be anchored to the trail or to other already tainted or altered cave features. Mid-rails will be added to handrails of extreme height or where mid-rails are required for safety. Both new and existing handrails will be formed to contour formations.

Stainless-steel handrail comforting to trail features

How the handrails will be installed

The handrails will be installed by monument personnel using the necessary tools and following the proper techniques. The pipes will be cut to length using a chop saw with the proper blades for cutting stainless steel. The rails will be bent onsite to the specified shape using an industrial pipe bender. The mid-rails will be added using stainless-steel fittings. The handrails then will be anchored directly to the trail by cementing them 8-10 inches into the trail's surface.

Bending the handrail with pipe bender

Drilling holes to anchor handrails

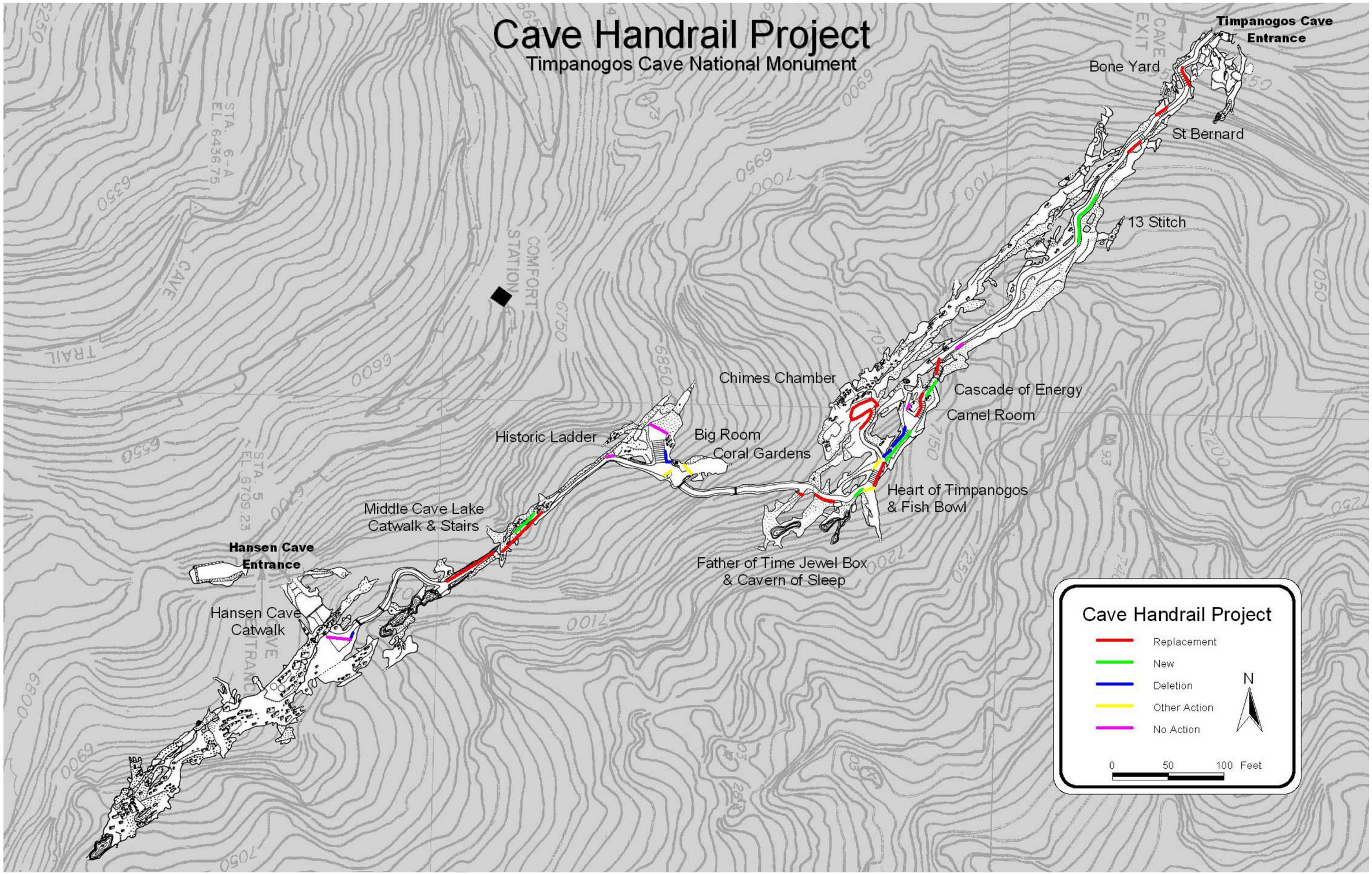
Priority Listing

The following list prioritizes actions with considerations to safety, resource protection, controversy, and costs.

Rank	Name	Action
1	13 Stitch	Add handrail to lead through 13 stitch
2	Stairs to Camel Room	Move existing handrail to lead up the entire right side of stairs
3	Turnoff to Chimes Chamber	Remove trail that goes underneath overhanging rock
4	Cascade of Energy Stairs	Replace handrail leading down stairs
5	Middle Cave Lake Stairs	Replace handrails and add handrail along the top left side
6	Big Room Rock	Chisel down the rock
7	Heart of Timpanogos Stairs	Replace handrail leading up right side of stairs
8	Chimes Chamber	Replace entire handrail system in the Chimes Chamber
9	Boneyard Stairs	Replace and extend handrail past the of stairs
10	St. Bernard Bridge	Replace existing handrail
11	St. Bernard Stairs	Replace existing handrail
12	Camel Room Stairs	Replace existing handrail leading up the stairs
13	Middle Cave Lake Catwalk	Replace existing handrail
14	Fish Bowl	Add contoured handrail that leads past constriction to Heart
15	Salt & Pepper Shakers	Add contoured handrail that leads past constriction
16	Heart of Timpanogos	Add rock barrier to platform
17	Coral Gardens	Add rock barrier
18	Father of Time Jewel Box	Remove handrail and add rock barrier
19	Cavern of Sleep	Remove handrail and add rock barrier
20	Hansen Cave Catwalk	Remove handrail and add rock barrier
21	Big Room Stairs	Remove handrail without replacement
	Arlo's Drip	Keep the existing stainless steel handrail
	Hansen Cave Catwalk	Keep the existing stainless steel handrail
	Chimes Chamber Overlook	Keep the existing stainless steel handrail
	Historic Ladder	No handrail will be added or other action will be taken
	Big Room Flowstone	No handrail will be added or other action will be taken

Cave Handrail Project

Timpanogos Cave National Monument

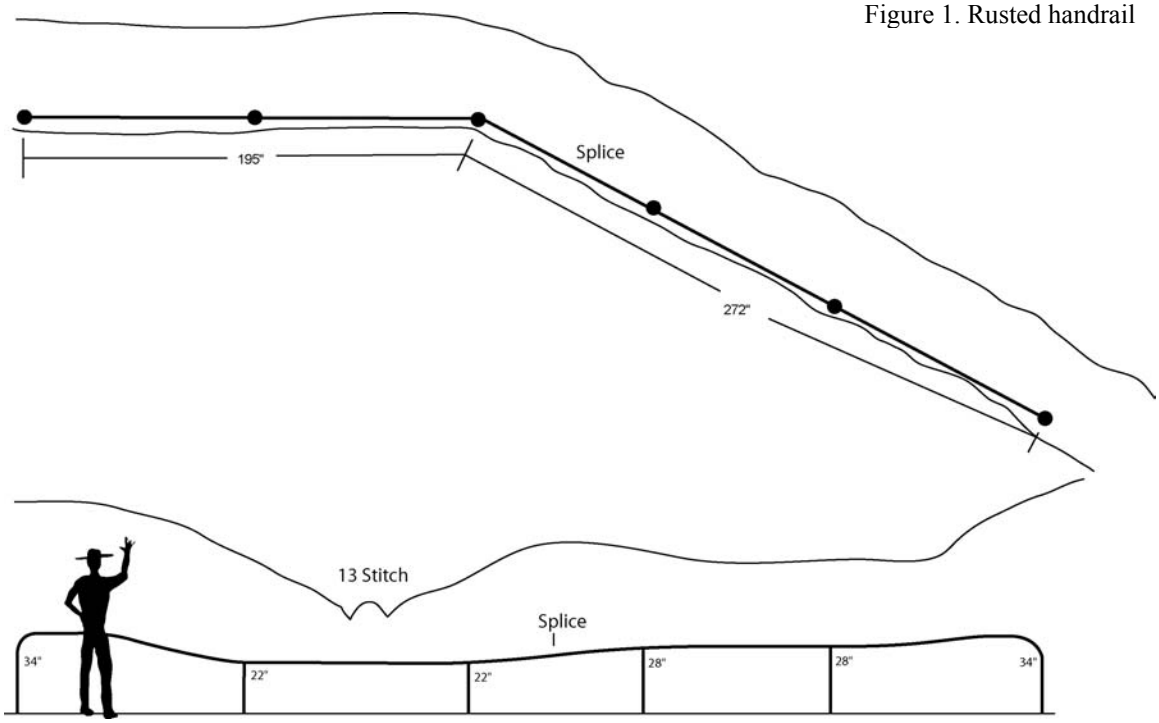


DETAILED SPECIFICATIONS

13 Stitch

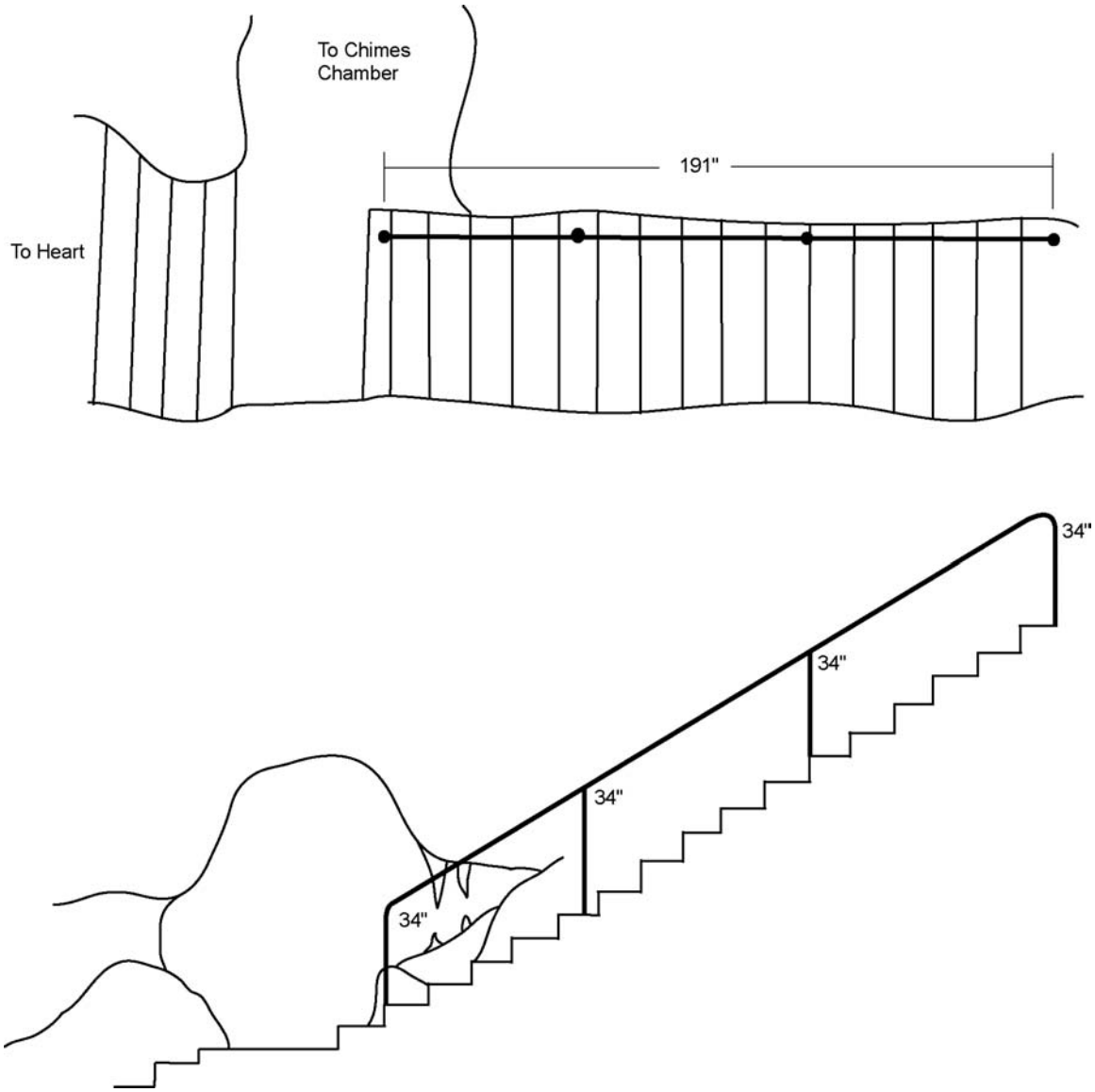
This area is named after the maxium amount of the stitches received by visitors hitting their heads in this spot. The handrail would start at full height just before 13 stitch. The handrail will contour through the restriction reducing in height to help safely move visitors past the low overhangs. The handrail then will extend to replace the existing rust coated handrail (Figure 1). This handrail should significantly reduce future head injuries.

Figure 1. Rusted handrail

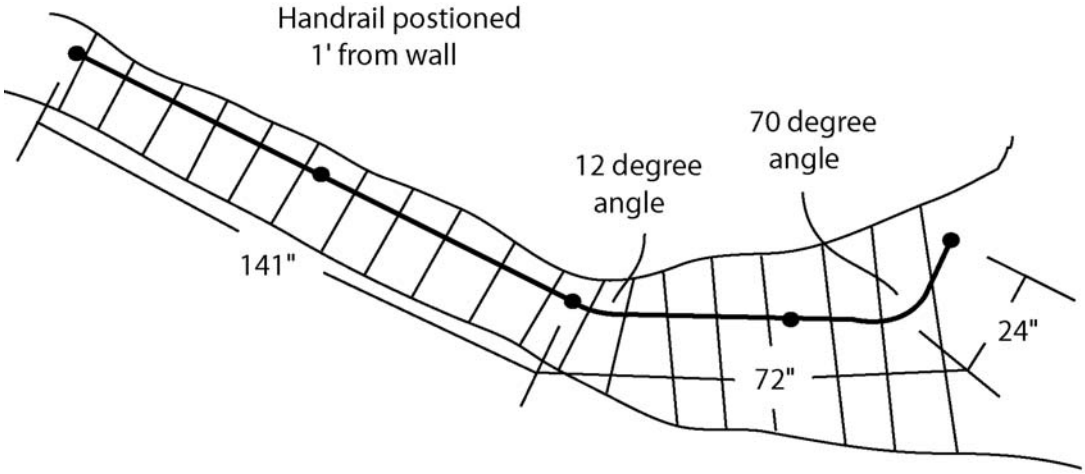


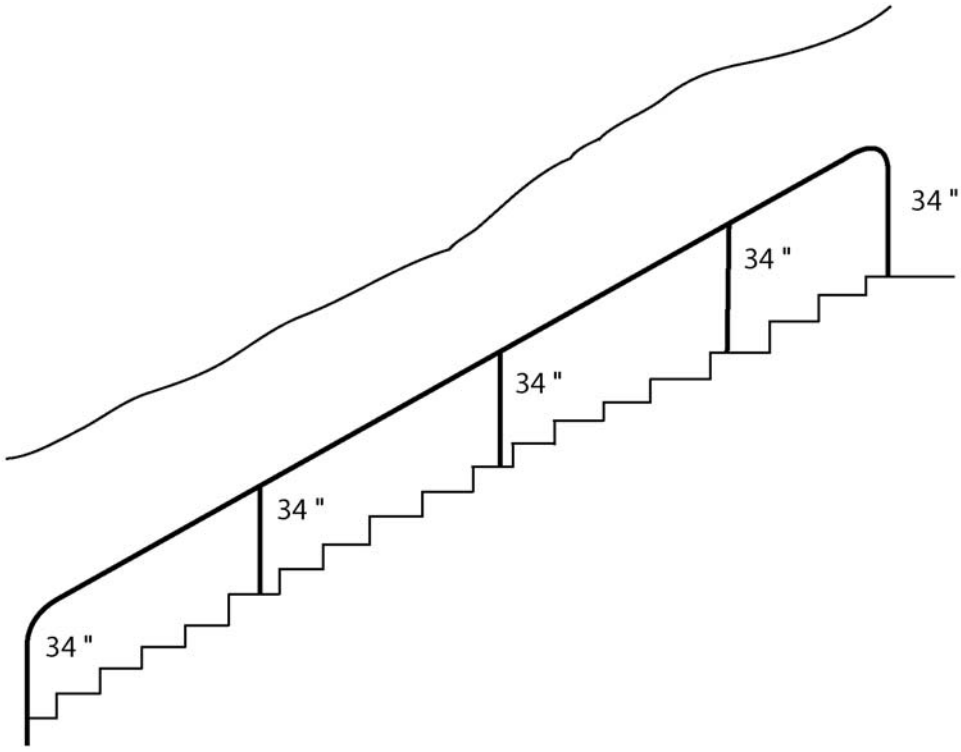
Stairs to Camel Room

Guides passing back through the cave often slip on these well polished limestone stairs. The handrails are essential for controlling a fall.



Stairs to Camel Room (Continued)





Turnoff to Chimes Chamber

Kids, trying to get in the front of tours, follow the outside stairs and often crash into the low over hanging formationt. Removing (or covering) the trail underneath this point will solve this problem (Figure 2).

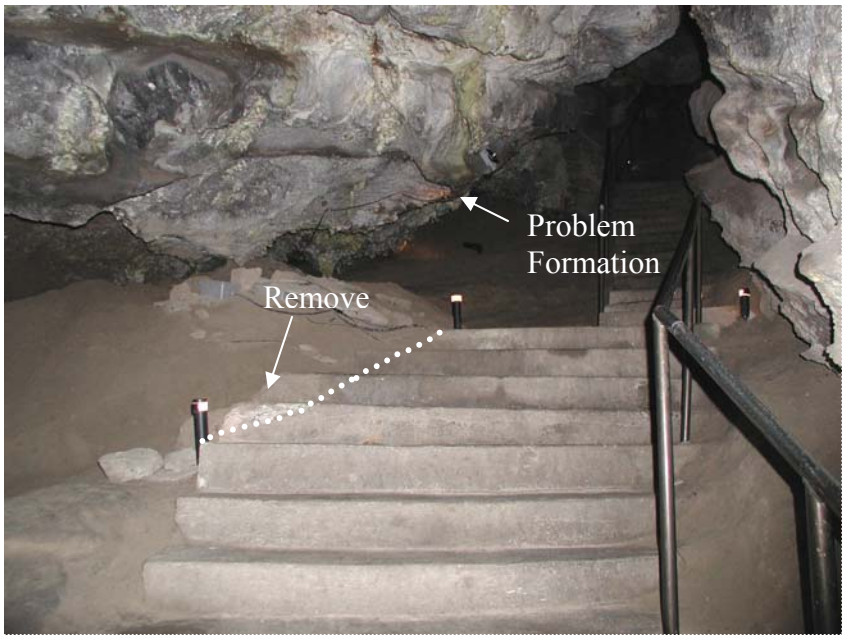
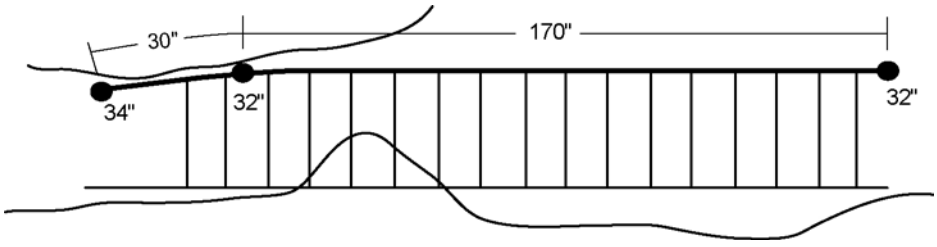


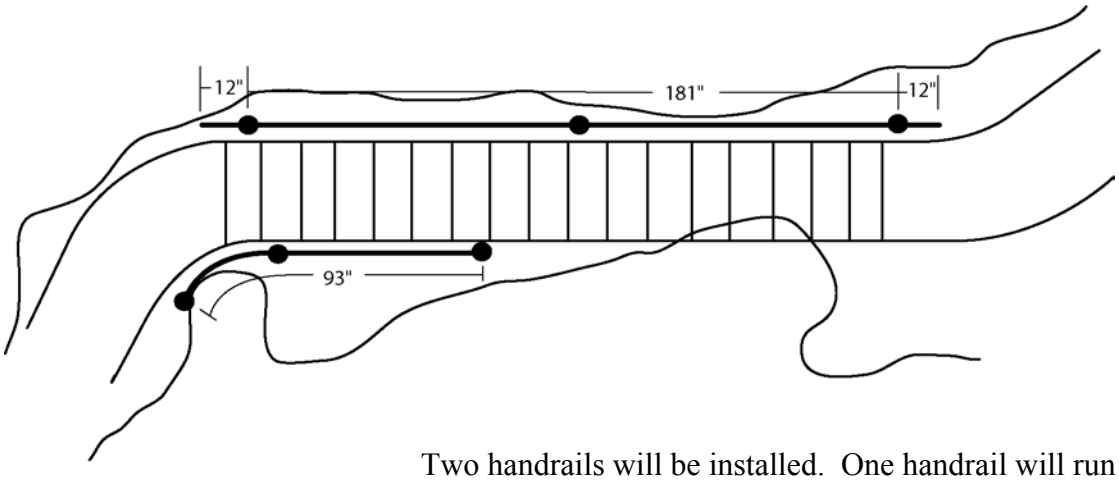
Figure 2. Picture of problem formation and steps to be removed

Cascade of Energy Stairs

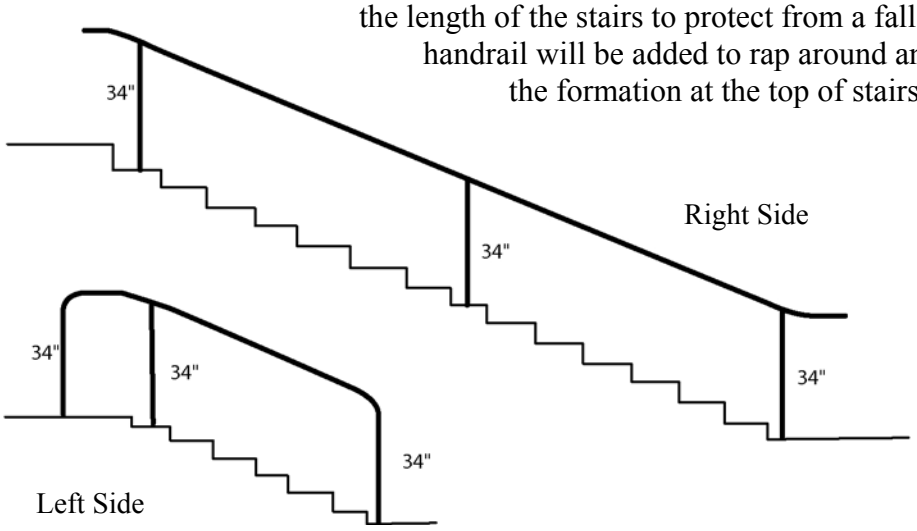
Water seeping off of the flowstone formation Cascade of Energy, mixed with debris from visitors' shoes, deposits layers of mud on these stairs. When not maintain regularly the stairs become a slip hazard badly needing a good handrail.



Middle Cave Lake Stairs



Two handrails will be installed. One handrail will run the length of the stairs to protect from a fall. Another handrail will be added to rap around and protect the formation at the top of stairs.

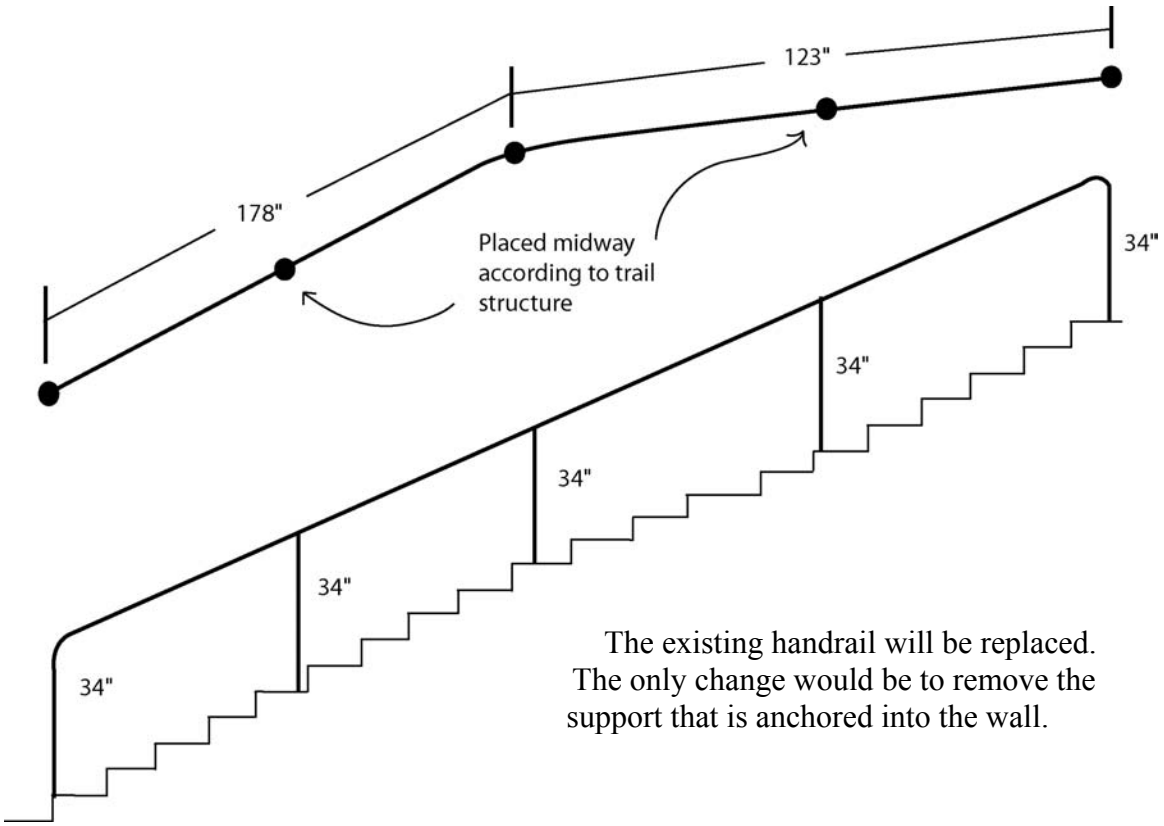


Big Room Rock

Along the main tour route a precarious rock sticks (Figure 3.) out into the trail. The proposed action is to chisel out this rock and cement over the removed rock's surface.

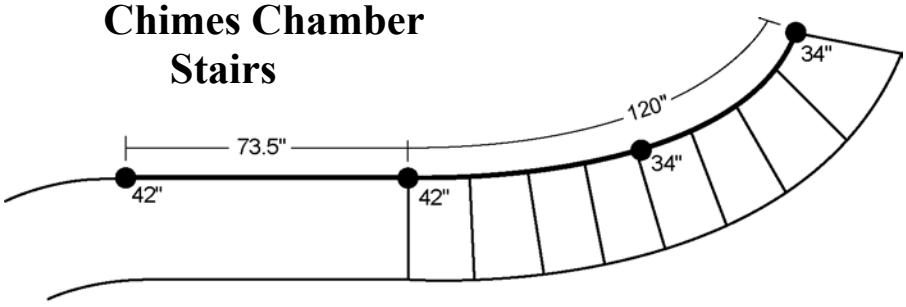
Figure 3. Obtrusive rock in the Big Room

Heart of Timpanogos Stairs

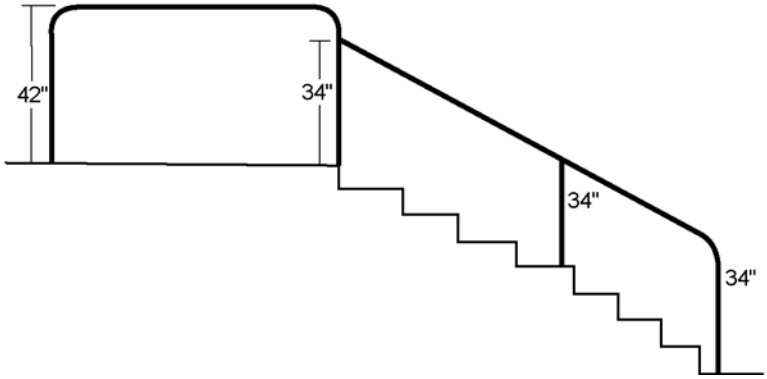


The existing handrail will be replaced. The only change would be to remove the support that is anchored into the wall.

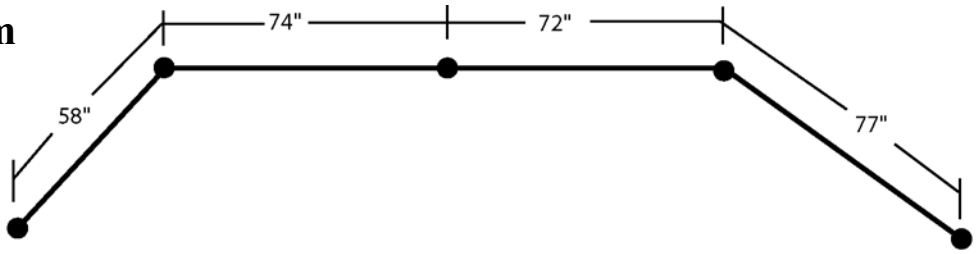
Chimes Chamber Stairs

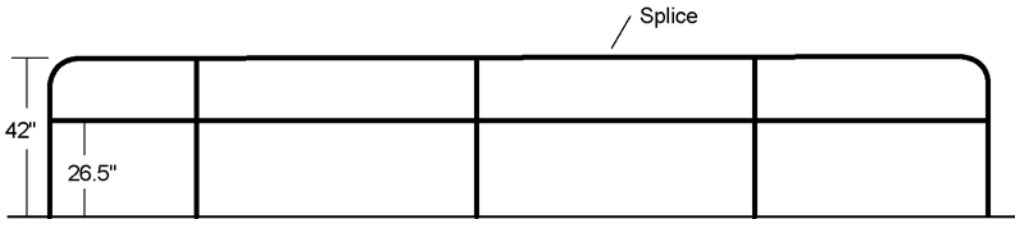


The handrail system in the Chimes Chamber will be replaced with the same design. The handrail will be constructed for strength to fit its primary purposed of being leaned on.

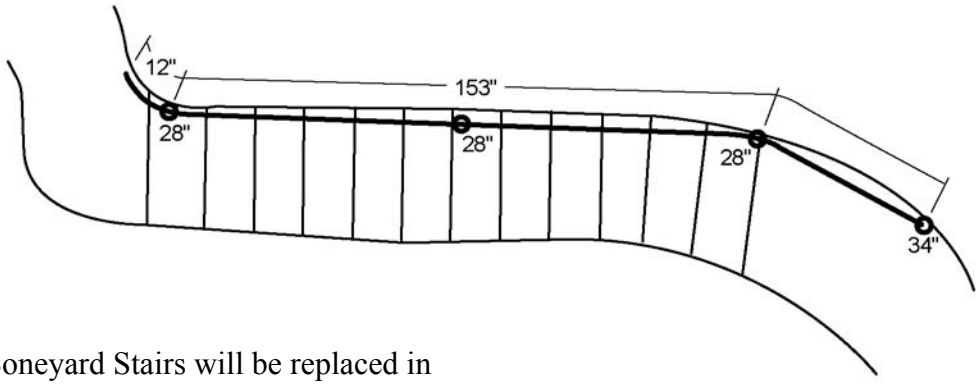


Platform

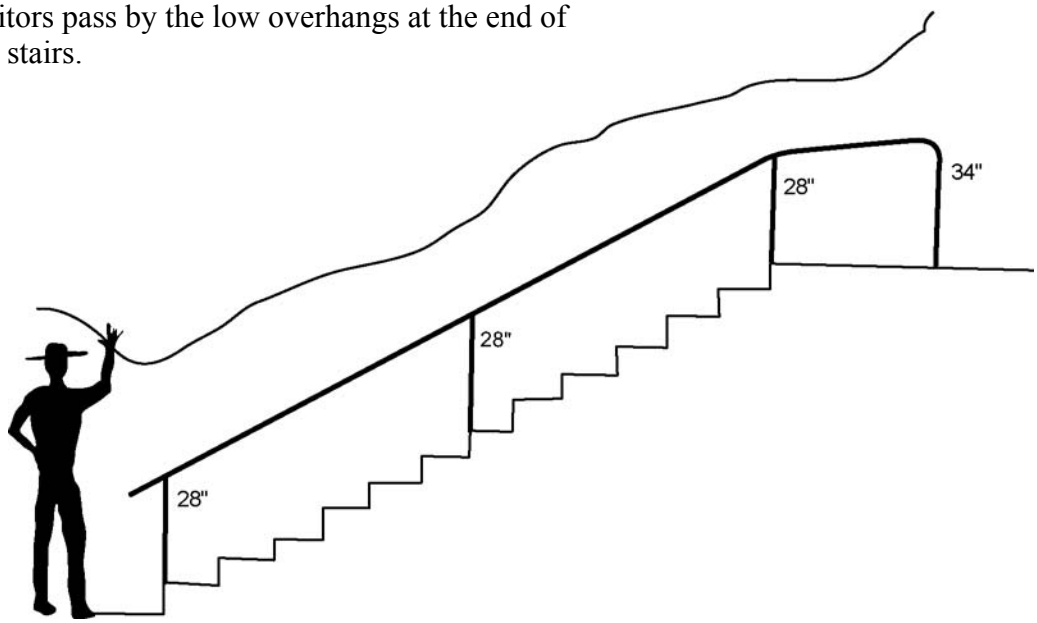




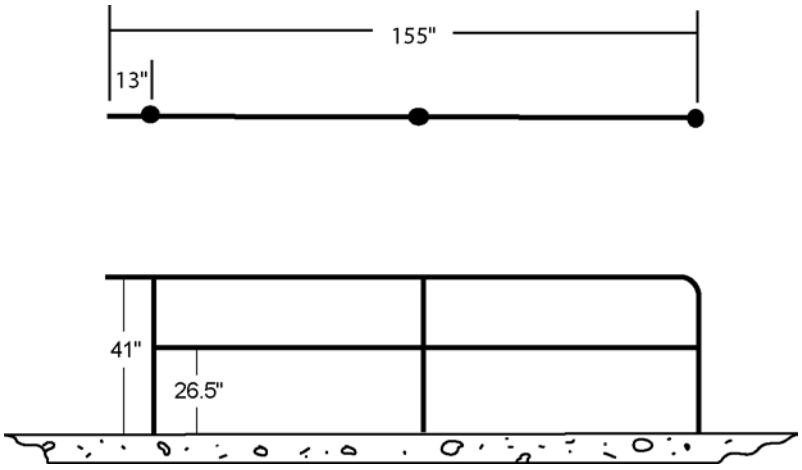
Boneyard Stairs



The Boneyard Stairs will be replaced in the same location. All of the handrails anchors will be located in the floor. The handrail will extend past the end of the stairs and grab around the corner to help visitors pass by the low overhangs at the end of the stairs.



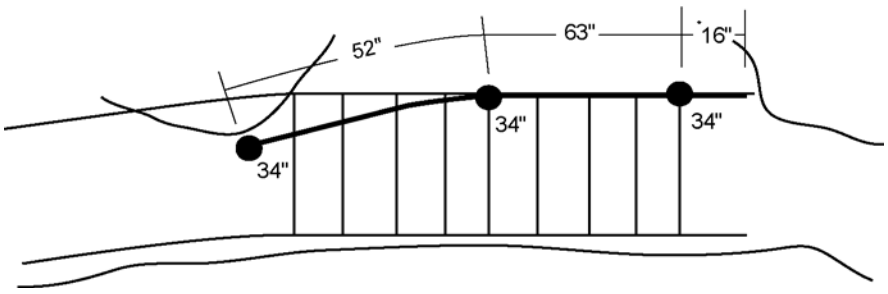
St. Bernard Bridge

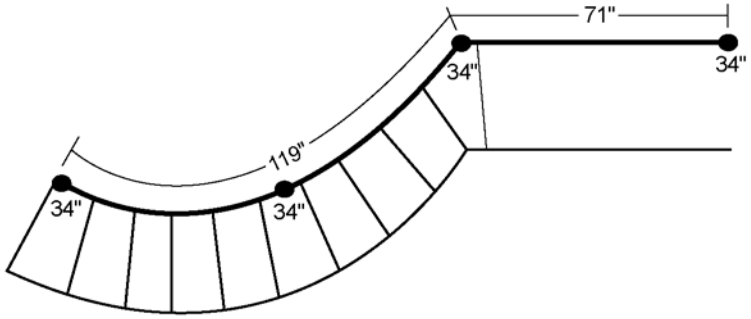


A simple double handrail will replace the existing handrails. This handrail will be designed to fit the changes proposed in the Restoring Cave Drainages Project. The handrail will be anchored into the side of the bridge and not cemented into the trail.

St. Bernard Stairs

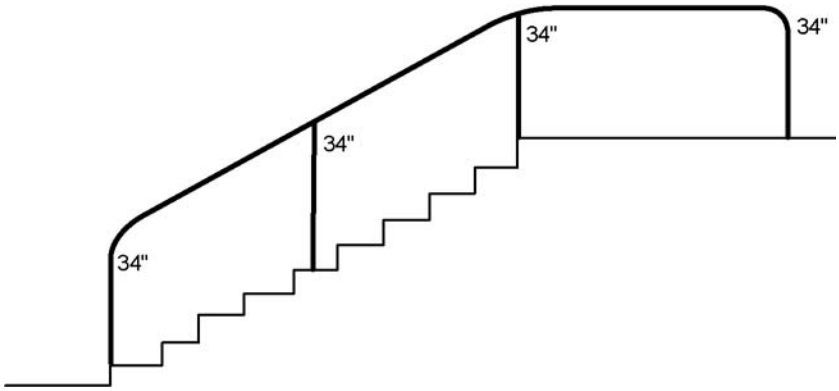
This handrail will be replaced with the top of the handrail placed outside of the overhang.



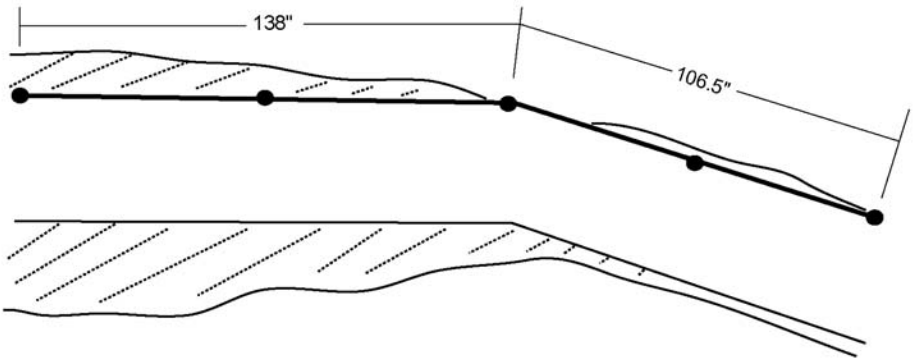


Camel Room Stairs

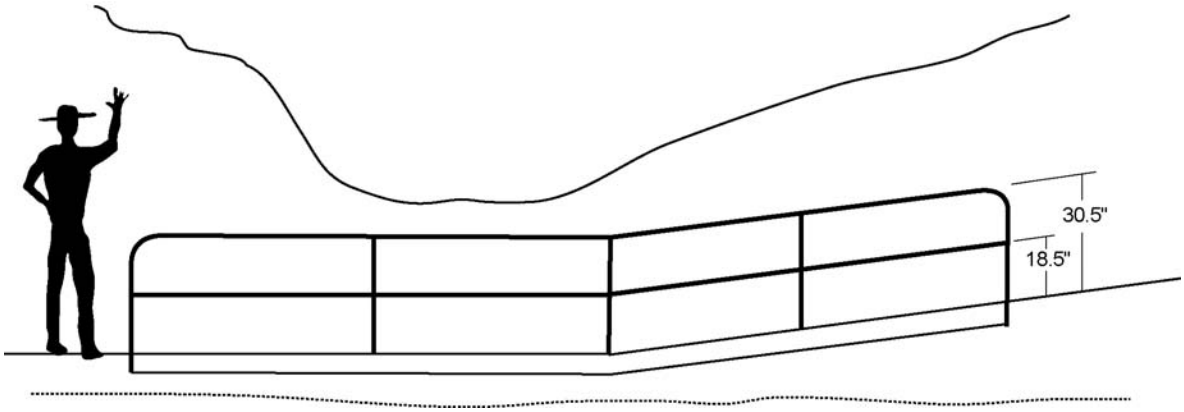
This handrail will be replaced to match the existing handrail.

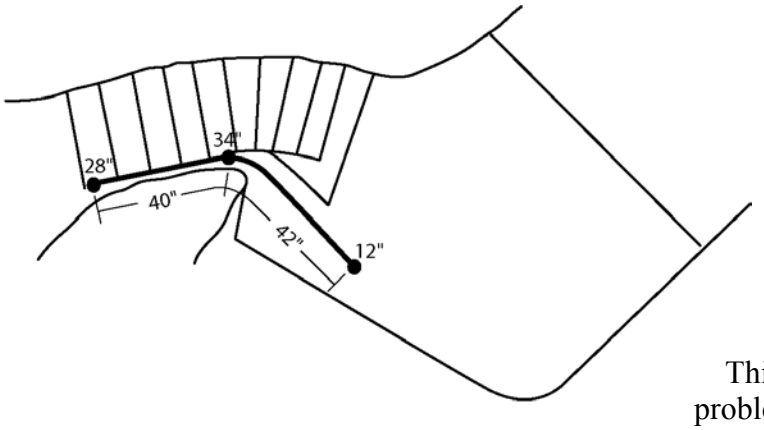


Middle Cave Lake Catwalk



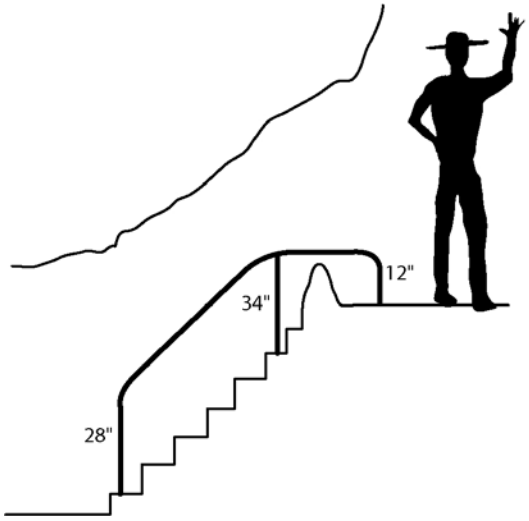
This handrail will be replaced to match the existing handrail.





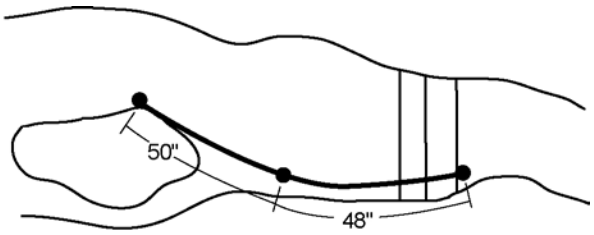
Fish Bowl

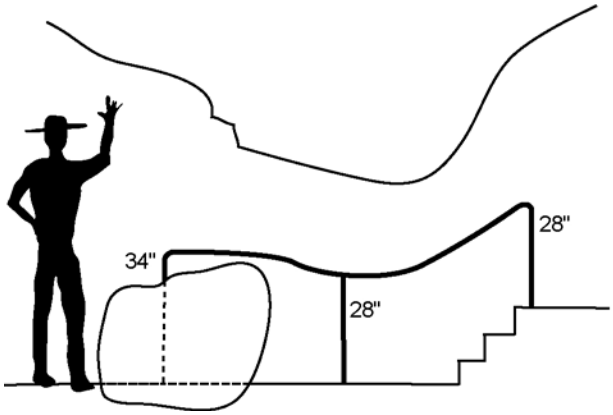
This location presents a problem of low overhangs and the presence of stairs in a confined area. This handrail will be added to follow the trail's contours from just beyond the Fish Bowl to just in front of the Heart. Due to the restricted amount of space the handrail must be placed parallel to the trail's wall by 2 inches.



Salt & Pepper Shakers

This location presents problems navigating up stairs within a confined area. The addition of a new handrail will also help protect the surrounding formations. The handrail will contour the trail from the indentation in the large rock on the trail, past the Salt Pepper Shakers, and to the top of the stairs.





Heart of Timpanogos

A rock barrier will be added to catch dropped debris and to deter visitors from leaving the trail (Figure 4.)

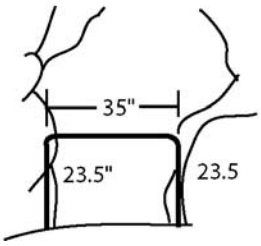
Figure 4. Platform above the Heart of Timpanogos

Coral Gardens

A rock barrier will be added to replace the parking curbs (Figure 5).

Figure 5. Coral Gardens and curbs to be removed.

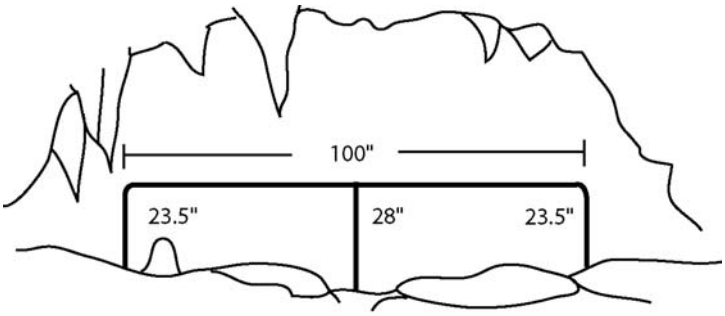
Father of Time Jewel Box



This handrail will be replaced with a handrail incorporating rounded (bent) corners. Handrail may be increased in height to 34 inches.

Cavern of Sleep

The current handrail will be replaced with rounded corners, posts at each end, and the addition of a third post in the middle. Handrail may be increased in height to 34 inches.



Big Room Stairs

The existing handrail will be removed. The light switches attached to the handrail will be moved to the rock wall hiding the electrical boxes (Figure 6).

Figure 6. Handrail in the Big Room to be removed

Hansen Cave Catwalk

The existing handrail will be removed and the trail will either be extended or a rock barrier will be added removing the possibility of kids falling off of the trail (Figure 7).

Figure 7. Handrail to be removed